



(11) **EP 1 580 250 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**28.09.2011 Bulletin 2011/39**

(51) Int Cl.:  
**C09K 11/06<sup>(2006.01)</sup> H01L 51/00<sup>(2006.01)</sup>**

(43) Date of publication A2:  
**28.09.2005 Bulletin 2005/39**

(21) Application number: **05250649.0**

(22) Date of filing: **04.02.2005**

(84) Designated Contracting States:  
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**  
Designated Extension States:  
**AL BA HR LV MK YU**

- **Aziz, Hany**  
**Oakville**  
**Ontario L6H 7L6 (CA)**
- **Hu, Nan-Xing**  
**Oakville**  
**Ontario, L16H 6B4 (CA)**

(30) Priority: **09.02.2004 US 774577**

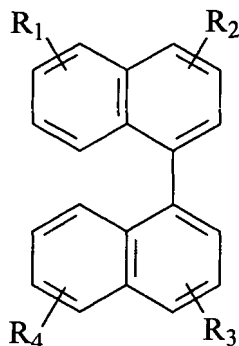
(71) Applicant: **LG Display Co., Ltd.**  
**Youngdungpo-gu,**  
**Seoul (KR)**

(74) Representative: **TER MEER - STEINMEISTER & PARTNER GbR**  
**Patentanwälte**  
**Postfach 86 07 69**  
**81634 München (DE)**

(72) Inventors:  
• **Coggan, Jennifer A.**  
**Cambridge**  
**Ontario N3C 4L6 (CA)**

(54) **Novel blue emitters for use in organic electroluminescence devices**

(57) An electroluminescent (EL) is provided comprising an anode, an organic electroluminescent element, and a cathode wherein the electroluminescent element contains, for example, a fluorescent 1,1'-binaphthyl derivative component of Formula (I)



(Formula I)

wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> are individual substituents or a group of substituents, each of which may be selected from the group consisting of hydrogen, or alkyl of from 1 to 25 carbon atoms; an alicyclic alkyl of from 3 to 15 carbon atoms; an aryl or substituted aryl with 6 to 30 carbon atoms; carbon atoms from 4 to 24 necessary to complete a fused aromatic ring of naphthalene, anthracene, perylene and the like; an alicyclic alkyl group with from to 15 carbon atoms; a silicon atom which can be substituted with a trimethyl, diphenylmethyl, triphenyl group and the like; heteroaryl or substituted heteroaryl of from 5 to 24 carbon atoms, carbon atoms necessary to complete a fused heteroaromatic ring of furyl, thienyl, pyridyl, quinolinyl and other heterocyclic systems; an alkoxy, amino, alkyl amino or aryl amino of from 1 to 25 carbon atoms; a halogen, a cyano group, and the like.

**EP 1 580 250 A3**



## EUROPEAN SEARCH REPORT

Application Number  
EP 05 25 0649

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                |                                                    |                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Citation of document with indication, where appropriate, of relevant passages                                                                                                                                                  | Relevant to claim                                  | CLASSIFICATION OF THE APPLICATION (IPC) |
| X,P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | WO 2004/067675 A2 (UNIV CALIFORNIA [US])<br>12 August 2004 (2004-08-12)<br>* paragraphs [0031] - [0062]; claims 7,8,16,17; examples 4,7-9 *                                                                                    | 1-4,7                                              | INV.<br>C09K11/06<br>H01L51/00          |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | US 6 660 408 B1 (TOGUCHI SATORU [JP] ET AL) 9 December 2003 (2003-12-09)<br>* claim 1; examples 1,11,12,14,16; compounds 16,26,33,36,40,46,47 *                                                                                | 1-10                                               |                                         |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | EP 1 167 488 A1 (IDEMITSU KOSAN CO [JP])<br>2 January 2002 (2002-01-02)<br>* paragraphs [0009], [0010], [0039], [0044], [0045], [0048], [0049], [0059], [0064]; claim 1; examples 4,6-9,13-16; compounds EM1,EM2,EM4,EM7,EM9 * | 1-10                                               |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                |                                                    | TECHNICAL FIELDS SEARCHED (IPC)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                |                                                    | C09K                                    |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                |                                                    |                                         |
| Place of search<br>The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                | Date of completion of the search<br>23 August 2011 | Examiner<br>Vanier, Cécile              |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>.....<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                                                                                                                |                                                    |                                         |

1

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 25 0649

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-08-2011

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| WO 2004067675 A2                          | 12-08-2004          | US 2004142206 A1           | 22-07-2004          |
|                                           |                     | US 2004151945 A1           | 05-08-2004          |
| -----                                     |                     |                            |                     |
| US 6660408 B1                             | 09-12-2003          | JP 2956691 B1              | 04-10-1999          |
|                                           |                     | JP 11339963 A              | 10-12-1999          |
| -----                                     |                     |                            |                     |
| EP 1167488 A1                             | 02-01-2002          | AT 360892 T                | 15-05-2007          |
|                                           |                     | CN 1322232 A               | 14-11-2001          |
|                                           |                     | DE 60034560 T2             | 16-08-2007          |
|                                           |                     | WO 0121729 A1              | 29-03-2001          |
|                                           |                     | KR 20050100708 A           | 19-10-2005          |
|                                           |                     | KR 20070042584 A           | 23-04-2007          |
|                                           |                     | KR 20070091375 A           | 10-09-2007          |
|                                           |                     | TW 474113 B                | 21-01-2002          |
|                                           |                     | US 6534199 B1              | 18-03-2003          |
| -----                                     |                     |                            |                     |